E2-43 Ohmic heating - the process impact on nutrients

E M R K B Edirisinghe[1,3], A Bamunuarachchi[1], A A P de Alwis[2]
([1]Dept. of Chemistry, Univ. of Sri Jayewardenepura, Nugegoda, [2]Dept. of Chemical Engineering, Univ. of Moratuwa, [3]Present address: NARA, Colombo 15)

Nutritional loses are one of the undesirable effects caused by thermal processing in food processing industry. Most of these effects can be reduced by using HTST (High temperature-short-time) technique. Ohmic heating is an electrical technique which can be applicable as a HTST technique. In ohmic heating, heat is internally generated within the foods, as a result of their electrical resistance, by passing an alternating electric current. In this study, destruction of Vitamin C during ohmic heating was studied and compared with Vitamin C losses in conventional heating.

A series of 3.5 mg/ml L-ascorbic acid solutions (prepared in 250ml 2.12 g/l NaCl, electrical conductivity = $4.98 \times 10^{-3} Scm^{-1}$) were heated ohmically using 2 carbon electrodes and alternating current (240V, 50 Hz) with changes in the heating rate by varying the current flow. The loss of ascorbic acid was measured with time (t) and time to boil (t_b) using a spectrophotometric method. The heating of L-ascorbic acid to simulate a conventional method was done by using a LP gas burner.

Decomposition of L-ascorbic acid increases with increasing the temperature of the medium. Also decrease in the percentage loss of L-ascorbic acid was seen when the heating rate was greater (14.4% and 12.4% losses in 0.4°C/sec and 0.55°C/sec respectively). The ohmic process was found to bring L-ascorbic acid solution to boil in 66 sec. compared to conventional heating with a flame which took 116 sec. But in 66 sec. of ohmic heating the L-ascorbic acid loss was 4.2% compared to conventional heating where the loss was 1.4% at 116 sec. This higher loss of L-ascorbic acid in the ohmic process may be due to the collision of the particles and electrical effects.